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MANAGING IDENTITY TRANSITIONS DURING RADICAL CHANGE IN NUCLEAR ENGINEERING ORGANIZATIONS

Abstract. This study reports the construction and reconstruction of identities of new and existing employees during a significant transition phase of a nuclear engineering organization. We followed a group of new and existing employees over the period of three years, during which the organization constructed a greenfield nuclear facility with new generational technologies whilst in parallel, decommissioned the older reactor. This change led to the transfer and integration of existing trade-based employees with the newly recruited, primarily university educated graduates in the new site. Three waves of interview data were collected, in conjunction with the cognitive mapping of social grouping and photo elicitation portrayed the stories of different group of employees who either succeeded or failed at embracing their new professional identity. In contrast with the new recruits who constructed new identities as they join this organization, we identify and report on the number of enabling and disabling factors that influence the process of professional identity construction and reconstruction during gamma change.

Keywords: professional identity construction, nuclear engineers, new employees, norm internalization, enabling and disabling factors

INTRODUCTION

Radical organizational change can threaten an employee's sense of who they are, especially when the existing scheme is well established, long lasting and an integral part of the employee's current identity. In this study we followed the identity construction and reconstruction processes of new and existing employees of a nuclear engineering organization over a period of three years. During this period, the organization commissioned a new site using new generation technologies operated largely fresh new recruits with university qualifications. Existing employees moved from the old site to the new site at various speed, and the old site was decommissioned at the end of this research period. This transition is considered radical as the old site was operated mostly by trade qualified professionals without colleague qualifications, and the organization purposely build the new site with different architecture features to complement the new generation technology and articulate the new culture which differentiate itself from the old technology and architecture.

Our study makes a unique contribution to this literature as the nuclear engineering industry is a small niche market where many employees embrace their professional identity for a life time. There are only a small number of organizations worldwide who operate in this space. The safety regulation that governs this industry often requires the sites to be built on remote locations where the families of employees live closely together for a long period of time. Thus the professional identity of being a member of this particular organization is core to our participants sense of self, it dominants not only their work life, but also their community and friendship circles.

METHOD

We used a grounded theory approach to examine the process in which nuclear operators come to understand, define, think, feel and behave within a distinct professional group. To achieve this, we followed multiple case studies across three periods of time. Photo elicitation, semi-structured interviews, and social identity cognitive mappings are used at all points to understand the changes in social identities. We have omitted a significant amount of details in this section due to space constraints. Details can be requested from the authors.

Research context and sample

Our investigation was situated within a nuclear, science and research organization referred to here as ChemCo. Since inception of ChemCo's establishment, production and operational work had been conducted in an aging nuclear reactor, referred to hereinafter as Alpha. In the early 1990s, fuelled by both internal and external forces, ChemCo began to plan, design and construct a new replacement reactor referred to in this study as Beta facility. The official commissioning of Beta facility occurred in the late 2000s. Simultaneously, the number of employees at Alpha facility also began to downsize through natural attrition, whilst a proportion received transfers to the Beta facility. Organizational change thus resulted in fundamental modifications to the organization in terms of its structures, systems, work practices and social processes. Figure 1 represents a section of ChemCo where Alpha and Beta are physically situated currently today. The physical layout of ChemCo is important and plays a vital role in existing employees ability to reconstruct their professional identity post-change.

Insert Figure 1 about here

Sampling

We initially measured 56 cases at T1; however, due to natural attrition, only 25 cases were routinely measured at multiple frequencies to reliably demonstrate evolutions in professional identity over three years. Table 1 represents the demographical details of the nine cases. Each individual case represents a unit of analysis for this study.

Insert Table 1 about here

Data Coding and Analysis

To make sense of the qualitative data, we utilized open coding, axial coding and selective coding advised by Neuman (2000) and Strauss (1987) to identify recurring and dominant themes. Figure 2 captured the process of the analysis and Figure 3 reported the main coding categories.

Insert Figure 2 about here

Insert Figure 3 about here

RESULTS AND DISCUSSION

The experience of change was different for the overall group. For new employees, the sense of change was based on their entry into a new social and working environment. In comparison, the experience of change for existing employees was organizational wide impact of constructing and commissioning a new nuclear facility. Within- and cross-case findings demonstrated that professional identity was constructed, evolved and reconstructed in a number of ways over time. Interestingly, we found that case studies followed similar patterns of anticipatory categorization and self-categorization prior to, and immediately after they experience change. However, we see deviation in the route that professional identity is constructed based on case studies' age and level of experience. We further found that this cognitive process is influenced by various factors that act to either enabled or disabled the process of professional identity construction. Table 2 highlights three prominent patterns of professional identity construction.

Insert Table 2 about here

- 1. Cognitive processes of anticipation categorization and self-categorization are triggered at the onset of professional identity construction for all cases. New employees and existing employees with lower level of identification to Alpha embraced the Beta identity with ease. However, existing employees with high level of identification with Alpha experienced anxiety and stress at the onset of the change process.**

Anticipatory Categorization

Cross-case analysis showed that all cases experienced anticipatory categorization and self-categorization during T1 and T2 measurements (Table 3) however the personal encounters differed based on whether the case was a new or an existing employee. Anticipation categorization marks the first cognitive stage of identity formation and is activated prior to experiencing change or integrating with new groups (Amiot et al., 2007). In the case of new employees entering into an organization, the onset of anticipatory categorization is activated prior to organizational entry. Due to the uncertainty experienced in this phase, the individual often engages in planning thoughts and behavior which may involve learning about the organization. Case study Lloyd explains, "*I read a lot, current affairs as well as history, I knew about ChemCo and that they were building a new facility...before applying*". Prior to entry, all nine cases new to the organization knew ChemCo as an organization, its culture and the type of work involved. For the graduates entering into ChemCo, their motivation was based on work opportunities and the perception of organizational prestige.

Michael who entered on a graduate program explains, *"Telling others that you will be working at ChemCo is impressive especially for a new graduate"*.

The construction of professional identity is in constant evolution, shifting and varying when the social structure and context changes (Amiot et al., 2007). As such, anticipatory categorization also prompts individuals to engage in heuristic processing which is the evaluation of their own self-attributes. This form of heuristic processing prompts individuals to project their own attributes and self-components on the novel groups they would soon be encountering. To exemplify this, Michael, he categorizes himself as *"very educated"*, *"young"* and *"extremely keen"* and based on the information he knew about ChemCo prior to entering, he has also assigned these qualities onto Beta which are cognitive efforts to make the new facility meaningful, relatable and to activate the initial feelings of belonging with the group.

For existing employees, the onset of organizational change triggered a different experience in anticipation. Cases who were involved in the construction and commissioning of Beta as well as those who were quickly transferred recalled a positive experience such case studies David, Billy, Brian and Lincoln (see T1 in Table 3). Case studies who were part of the commissioning group or perceived as an out-group member, the change was regarded as an exciting opportunity. For instance, David recalled that he was part of the *"prestigious"* commissioning group, thus the movement from Alpha to this group was considered as upward social mobility (Tajfel, 1978). Similar sentiments were reflected by Billy who is a process worker. Billy explained that historically, there had always been *"tension between operators and process workers"*, thus his prompt transfer to Beta was regarded as social emancipation from Alpha.

However, the transfer of a number of Alpha individuals heightened anxiety and negativity in the remaining Alpha cases. To exacerbate their predicament, a number of employees from Alpha claimed that their job stability was ambiguous as they were informed to reapply for positions in Beta. For those who were left behind or awaiting transfer news, they exhibited clustering behaviors (e.g. *"We only had each other than"* and *"just got to stick it out together"*). The sense of uncertainty triggered by an ambiguous environment can prompt pre-changed group to align to develop a higher sense of identity or in-group congruity (Amiot et al., 2007).

Anticipatory categorization also triggered planning thoughts and behaviors. Stephen explained that he *"evaluated my future with ChemCo and weighed my options"*. Upon evaluating his options, Stephen chose to remain in the company on the basis, he claims, of the promise of immediate transfer into Beta post-construction by management. However, his prolonged wait for transfer triggered feelings of *"resentment"* and the perception of being *"duped"* by management. This was detected in the social identity cognitive mapping activity (T1 in Table 3) whereby he refused to acknowledge the Beta facility or corresponding Beta groups, and reluctantly drew Beta in the corner after being prompted by the researcher. During this activity, Stephen showed that he preferred to concentrate on his current Alpha groups and own facility. He expressed that he felt like *"an outsider"* when he saw *"half of my guys receiving training to go into Beta"*. His frustration was reflected in his tone of voice, his facial expressions and further reinforced by crossing half of Alpha in the social identity cognitive mapping activity. During T1, he further demonstrated his rejection of future social groups, claiming that he had seen the new employees *"through the metal fence but had not stepped over this fence into the new facility"* believing that *"the fence should stay up to keep Alpha and Beta distinct"*. Stephen's perceptions of increased closeness with his collective, the combination of anxiety and uncertainty and planning behaviors are all characteristic of anticipatory categorization.

We used retrospective photo elicitation technique to trigger Julian's memory to the events and timeline in T3. This technique was effective especially for cases such as Julian who displayed an introverted personality. Based on the second set of photos, which contained images depicting the building of Beta facility, Julian recalled feelings of nervousness and anxiety due to the uncertainty of the impending change.

Insert Table 3 about here

Self-categorization

Self-categorization explains the cognitive analysis and segmentation of the social context into different social categories and provides structure of the social world and importantly a referent system for the individual (Bennett & Sani, 2004; Turner, 1982). Essentially, self-categorization explains that the manner in which an individual experiences and understands him or herself, and is based on the specific self-conception that becomes activated. The self-concept is drawn from self-categorization, which contains the “cognitive grouping of the self as identical to some class of stimuli in contrast to some other class of stimuli” (Bennett & Sani, 2004, p. 12).

Self-categorization was characterized by the individual’s recognition of highly differentiated and distinct identities, a stronger preference for one identity over another, an all-or-nothing tendency to accept social identities as well as an increase in group conflict. The social identity mapping activity demonstrated was able to clearly capture this cognitive process. For instance, case study Lloyd categorized himself as belonging to two immediate social groups, which were operators and the commissioning group in T1. He explains that, “*I was hired to be part of the commissioning team. There were eight of us altogether from memory, but I was also trained as an operator, so I guess belong here [commissioning group] and here [operating group]*”. Across the three times of measurement, Lloyd continued to align his professional identity with Beta which was a consistent finding across all new employees in this study.

A similar pattern was witnessed for existing employees in terms of their self-categorization however, deviation occurred based on the strength of their prior organizational identification. To this end, we will compare case studies Tom, Wallace and Stephen who strongly identified themselves with the Alpha professional identity against David and Billy. Case studies Tom, Wallace and Stephen have worked at Alpha facility for 20, 26 and 21 years, respectively. They describe that at Alpha, “*We were all tradespeople, and a lot of us had engineering backgrounds as well, we all fitted in quite well.*” For many years since ChemCo has been in operation, technical backgrounds, practical skills and trades were considered acutely important. Both cases reflected that attributes relating to employees’ skills, knowledge and experience were highly important in Alpha. For instance, senior staff such as Duty Manager and Supervisors who had possessed procedural and tacit knowledge (e.g. “*You really had to know the system and how it behaved*”) influenced the operations and the structure of their workgroups and shifts. Additionally, there was evidence to suggest that loyalty and commitment were directed at the facility as Wallace enthused, “*We always looked after the girl*”. The frequent personification of Alpha facility to a female human expresses the case study’s pride and sense of protectiveness from those outside the limits of this workgroup.

In viewing his self-categorization, during the social identity mapping exercise Tom identified himself as part of most, he responded, “*Alpha of course*” and drew a representative asterisk within the boundaries of Alpha facility. In T2, Tom explained that he had been re-employed by ChemCo, and had received full training to enter into Beta as a shift operator. Tom reflected that his initial entry into Beta was “*a little tricky*”, as there were “*many new faces, not as many old faces*”. Tom’s descriptions of unfamiliar faces signaled his recognition of the social distance between himself and Beta newcomers. The dichotomy of “*new faces*” and “*old faces*” epitomizes depersonalization and social categorization (Hogg et al., 2004) which are central in the process of self-categorization.

The cognitive transition and transference of professional identification from Alpha to Beta was most remarkable in case study Stephen. Stephen appeared to be a dominant individual within the original Alpha group, proclaiming himself as an “*active fighter for operators’ rights*” in the

early days. The cognitive-developmental model of social identity integration (Amiot et al., 2007) explains that novel social identities are acquired within the self-concept. In particular, it rationalizes that as the individual's perception of the self broadens as they are likely to "relinquish or let go of some identities that are already in place within the self" (Amiot et al., 2007). The process of relinquishing is hypothesized to be akin to the social cognitive process required for integration. This occurs upon consistent deactivation of social identities as well as in the absence of social links that tie the individual to their previous collective (Amiot et al., 2007) which was evident in Stephen.

On the other hand, case studies David and Billy were quick to acclimatize to the changed environment and readily perceived themselves as "[I am] *part of Beta*". Although this is a positive outcome for an organization going through dramatic change, David and Billy's lack of cognitive affect and evaluation may signal their likelihood of possessing a situated (Rousseau, 1998) and fleeting social identity (Scott et al., 1998). Rousseau (1998) explains that a situated social identity is activated by the situational social cues and is both transient and unstable. This transience is similar to a fleeting social identity and highlights the individual's tendency to change their social identity depending on what is deemed advantageous. Interview and social identity cognitive mapping data revealed that both David and Billy believed they were on the peripheral of all social groups when Alpha was still in operation. Due to this perception of exclusion, they did not invest efforts in developing connections with their colleagues and were able to easily adapt after the change process.

2. The manner in which group properties are internalized is influenced by age and level of experience

Our findings showed that operators' level of experience and age profile influenced the manner in which they internalized their social group norms and values. Specifically, we found that six out of the twenty-five cases who had little to zero professional and industry experience showed a tendency to deduce the norms of their groups before internalizing them. On the other hand, employees who had previous experience were more likely to leverage on previous experience to induce onto their new group.

In the early stage of social formation, operators with less experience were likely to engage in deductive internalization whereby their initial professional identities would be constructed through the collected recognition and sharing of unique common characteristics (e.g., attitudes, similar goals, interest or background) at a group level and within a given social context. We reason that as the operator categorizes the different operating social groups around them, they also exert effort in recognizing commonalities they might share with their immediate group. We further theorize that the deduction of these attributes fuels their internalized group identity, which also comprises normative attitudes, behavior and stereotypes.

An interesting observation based on their demographical details in Table 1 shows a large age gap between the first six and the nineteen cases. The age span of these six cases was between 25 and 30 years old, whereas the rest were age of 31. Thus, the cumulative effects of little experience and youth may provide insight into the reasons why younger, less experienced new entrants were more likely to begin internalization deductively before inducting change. It is possible that the younger, less experienced new employees undergo a series of socialization and sense making, whereby immediate social cues are embraced, accepted before internalization.

Whilst the six less experienced operators demonstrated a tendency to observe, relying on the expectations of their immediate group (e.g., shift, operating, maintenance groups, etc.), highlighted in Table 4, the remaining nineteen cases were highly skilled members who had prolonged experience at either ChemCo or in a similar industry. These cases were more likely to rely and exert previous knowledge and skills to shape the social content their group. To demonstrate, the language used by the older more experienced case studies included dominant use of singular pronouns (e.g., "I") as oppose to plural pronouns (e.g., "we", "us" and "ours"). Their reliance of

“I” references highlights their elevated perception of self and the individualistic role within their group. Specifically, experienced new employees believe they have a role in leadership by imparting their knowledge onto those they consider being less experienced. This unconscious attitude and behavior is reflective of induction as Postmes et al. state, “the individual contributions of group members serve as input for the induction of (parts of) the group’s social identity” (Postmes et al., 2005). Evidently, this association highlights the role of social influence, which is the individual’s capacity to alter another’s belief, attitude and behaviors through democratic communication of information (Bagozzi and Lee, 2002, Friedkin, 2001, Mugny et al., 2002), in shaping the content of their immediate group and reinforcing the activation of inductive internalization.

Insert Table 4 about here

- 3. Experienced employees are likely to engage in inductive internalization to influence their new professional groups however, if their effort is rejected, the presence of the enabling factor of group homogeneity buffers the perception of social disconnect and aids in the reconstruction of one’s professional identity. On the other hand, the presence of disabling factors can hinder the construction of one’s professional identity.**

Enabling Factor

Cross-case analysis showed that older and more experienced employees were likely to draw on their acquired skills and knowledge to influence their new professional group. Data also showed that although this was the general pattern, it did not mean that new groups immediately accepted this assertion. This produced two main pathways that will be discussed in this section and the following. The first pathway is that experienced employees draw on their acquired skills and knowledge to influence existing groups. If they are met with rejection, however, there is the presence of group homogeneity (e.g. being on the same shift with their "mates" and previous colleagues) mitigates the risk of the feeling socially abandoned and their inability to adapt to the changed environment. That is, case studies who are allocated into a shift / workgroup that comprised of similar individuals or a homogeneous group (e.g. based on prior experiences working together, common background, etc.) were more likely to draw on the sense of camaraderie, history and attachment which facilitates the process.

Group homogeneity

Experienced case studies such as Stephen, Julian, Brian and Wallace claimed that group homogeneity played a role in their transition which can be seen in Table 5. For instance, the allocation of multiple Alpha employees into a single group, team or shift provided a sense of continuity. This sense of continuity was vital for Alpha cases as such familiarity, which permitted them a form of stability and the comfort in knowing that they would endure the change together (Ullrich et al., 2005). Case study Stephen initially disclosed difficulty in letting go of his previous identification. His reasons were based on his belief that management had breached a promise regarding transferal and training. However, this sentiment was reduced in T2 and T3 as Stephen was able to “*let go*” explaining that being on shift with “*my best friends helped*”, buffer the impact of change and provided him with a sense of both familiarity and continuity and assisted him to reconstruct this professional identity.

Insert Table 5 about here

Disabling Factors

The second pathway is that experienced employees draw on their acquired skills and knowledge to influence existing groups. However, if they are met with rejection *in addition to*

encountering perceived transgressions of psychological contract breach, exclusion, lack of organizational support, social isolation and group heterogeneity, case studies were unable to adapt to their new social environment which is captured in Table 6.

Insert Table 6 about here

Psychological contract breach

Psychological contract breach was one of the main disabling factors that was collectively described to have hindered Alpha employee's reconstruction process. A psychological contract symbolizes the perception of mutual and reciprocal understanding, beliefs and informal obligations delivered through promises between an employee and their employer (Rousseau, 1995, Rousseau and Schalk, 2000). For instance, an employee may believe that they contribute their knowledge, skills and continuing commitment to the organization in exchange for rewards such as job security, career advancement and respect. Consequently, a psychological contract breach occurs when the employee perceives that there is a failure in the fulfillment of promises and obligations. The outcome of psychological breach is often adverse, triggering emotive responses such as violation and can lead to negative behavioral outcomes (Morrison and Robinson, 1997, Robinson, 1996).

In terms of professional identity, it is likely that members experience the psychological process of social comparison following the breach (Morrison & Robinson, 1997). In practice, individuals evaluate their own situation and compare it to that of their peers. Based on this comparison, if cases believe that others in their predicament are in better position, there is the perception that a similar future is attainable and thus change is possible. However, in the current context all cases were able to vividly recall the breaches of psychological contracts and most were able to explain its continuation. Analysis showed that for these cases, there was a strong presence of perceived psychological contract breach, which may have contributed to their inability to reconstruct their professional identity post-organizational change. Predominantly, psychological contracts were made prior to organizational change and were centered on the promises of job security, the construction of workshops within the Beta boundary as well as an increase in personnel. Due to the interpretivist nature of this research, it is necessary to emphasize that obtained results represent each case's perceptions, understanding and interpretation of events rather than notions or beliefs advocated by management or ChemCo as a whole.

Job security. A major proportion of the cases who experienced difficulty attaining or reconstructing a new professional identity stated that management's inability to uphold promises regarding job security prevented them from settling in post-change. According to them, prior to the opening of Beta eleven out of fifteen Alpha employees alleged that they were assured the security of their jobs. In addition, it was also claimed that they were "*promised*" to receive training and be promptly transferred over to Beta. However, as Beta began the commissioning process, there was little communication as to what was going to occur. Alpha employees were left in the lurch and did not know the security of their jobs or if management were going to keep their words. This tension was further exacerbated when Alpha members witnessed a number of their colleagues being made redundant. For instance, Bob explained that, "*we knew we were going to lose a few familiar faces, but unsure who and when*", triggering some employees to "*jump ships*" through voluntary retirement or gaining employment elsewhere. By leaving and resigning during this time, Alpha cases were able to exert some form of control over their work futures. This is a behavioral response documented in the anticipatory phrase of cognitive-developmental social identity integration (Amiot et al., 2007).

Despite that, a large number of Alpha members clung onto the belief that management would keep their words and deliver on their promise. For this group, there was an "*intense feeling of betrayal*" when they realized that their equivalent Beta positions were advertised internally and in the local newspapers, implying that their jobs were not secure as previously promised which is reflected in Jonathon and Bob's sentiments in Table 6. For Alpha employees, it meant they were

engaged in a lengthy process of recruitment and selection, as well as competing with others for a position at Beta. Jonathon and Bob recalled that management attempted to reassure Alpha employees by claiming that the process was merely “*a formality*”. Collectively, it was claimed that the process induced Alpha members with many negative feelings ranging from, “*unnecessary stress and anxiety*”, “*a sense of rejection and exclusion*” and a “*mistrust of management*”. This experience further damaged the relationship between Alpha employees and management as well as tainted any potential new social relationships between Alpha and Beta members.

The Construction of Engineering and Maintenance Workshops. In the earlier phase of designing of Beta, it was initially planned that the engineering and maintenance workshops would be incorporated into the facility. However, due to financial cutbacks, this idea was scrapped as highlighted by Jonathon below. Consequently, the workshop remained on the *Alpha* grounds whereby engineering and maintenance members were required to trek from their workshops located on Alpha grounds to tend jobs at Beta.

Although it was acknowledged that the cost involved in the construction of workshops was exponential, because management had communicated this idea at the beginning, Alpha members were keen to see if this obligation would be fulfilled. Thus, management’s inability to provide personnel with appropriate workshops resulted in further resentment towards management. In addition, as workshops remained on Alpha grounds, it led to a sense of isolation, which further hindered the development of new social relationships with Beta newcomers. Of the five cases (e.g. Bob, Lincoln, Jonathon Nick and David) that occupied roles in the maintenance and engineering divisions, four failed to reconstruct their professional identity to align with the new Beta group. The sole engineering and maintenance Alpha employee who showed successful reconstruction was David, who revealed that his office was located within Beta facility as his work had “*steered more towards decision making than engineering*”. As such, it can be argued that David was unaffected by the segregation or isolation. This sense of isolation via physical segregation will be touched upon again in the following section exploring perceived exclusion.

Postmes et al. (2005) argue that the internalization of group norms and values is dependent on communication to achieve group consensualisation. As such, it can be rationalized that the isolation of these workshops negatively affected members’ ability to communicate, exchange ideas and establish social and working relationships with one another. Thus, the lack of exchange would also limit members’ ability to understand and reflect on commonalities and hence pave the way for the development of smaller disparate groups.

Lack of personnel. All existing employees reported on severe lack of available personnel. Case study Tom explains that, “*there use[d] to be four operators, now it’s three so work is tight*”. Cases indicated that this problem was detected earlier during the opening of Beta whereby management would take a “*proactive role in recruiting more professional staff*”. However, over the three years of this research, cases explained that workload “*has not improved*” and “*numbers are still lacking*”. He elaborated that management had promised his team more staff members, however rather than complying with their promises, management “*swallowed their words*” and fired one existing member on his team without providing a replacement. This act of reneging angered Nick as his tones and facial expressions changed, giving insight into the feelings of violation this breach triggered. The lack of available skilled professionals has meant that some cases “*have not had a flex day, sick day or holiday in more than two years*”. Cases explain that they are often at work “*more than I really want, but there is so much to do*”. As a result, management’s prolonged, yet unfulfilled promise of more staff has led many members to experience a lack of life/work balance as well as promoting “*high levels of stress and anxiety*” and in some cases being “*on the verge of burnout*”.

Perceived Exclusion

Intrinsic to professional identity is the assumption that one's self-esteem and self-worth is connected to their group membership (Hogg and Terry, 2000, Branscombe and Wann, 1994).

When this sense of belonging is threatened, it can trigger the perception of exclusion or social rejection by the valued group, which can lead to attempts of regaining the acceptance of the group or overall negative consequences such as leaving the organization. Perceived exclusion is “the extent to which an individual (or group) perceives that they are being rejected, ignored or ostracized by another individual (or group) within their place of work” (Hitlan and Noel, 2009). Analysis of the data revealed that perceived exclusion played an important role in members’ ability to reconstruct their professional identity. In this group, perceived exclusion occurred in two ways. The first related to the exclusion in the form of involvement of Alpha employees during the construction and commissioning of Beta facility. The second relates to the perceived sense of exclusion due to the isolated locations of engineering and maintenance workshops.

Exclusion during construction and commissioning of Beta. A large number of Alpha cases expressed a sense of frustration and social rejection of “*not being included*” or “*involved*” during the construction and commissioning of Beta. Historically, Alpha employees prided themselves on their high levels of technical skills and knowledge as well as ensuring safe and reliable operation. However, their exclusion in the initial construction of Beta led to the perception of no longer being valued. This direct exclusion led to further social gaps between Alpha and ChemCo management as well as damaged prospective relationships with new Beta employees who were involved commissioning of the new facility.

Perceived lack of organizational support

Perceived organizational support is typically concerned with the extent to which an employee perceives that their organization acknowledges their contributions and takes personal interest into their wellbeing (Eisenberger et al., 1986). This perception is stimulated by the actions of the organization and treatment of its employees, providing an avenue for employees to assess the motivations of the organization. The perception of organizational support can take form in multiple manners such as the delivery of organizational justice and fairness, the provision of management support as well as organizational rewards and job conditions (Rhoades and Eisenberger, 2002). In particular, Alpha cases perceived the lack of management communication and inadequate training to be a demonstration of ChemCo's lack of organizational support.

Management communication. Management and supervisors are often viewed as representatives of the organization thus the degree in which they are perceived to value an employee’s contributions and wellbeing is important (Lord and Brown, 2001). In times of change, they are often the enduring figure providing support to their employees. Consequently, a lack of management support can lead to negative results for both the organization and the employee (e.g. Eisenberger et al., 1997, Baruch-Feldman et al., 2002). Alpha cases explained that this lack of support hindered their ability to feel part of the larger Beta collective.

Alpha cases reflect that the level of supervisory support was “*exceptionally high*” back at Alpha, recounting that meetings were frequent and the “*handover process was completed in the presence of shift workers and our supervisors*”. The presence of management support inspired a high level of team connectivity and camaraderie amongst shift workers, which often extended outside of the work domain. For instance, before leaving ChemCo, Smith explained that “*social dinners was a common thing*” shared amongst Alpha members. Tom elaborated that, “*we would usually attend each other’s birthdays, weddings, and, ah, christenings*” which fostered a collective perception of the group. In contrast, the style of management and supervisors at Beta were described to be “*very formal*” bordering on being “*aloof*”, which hindered the development and deepening of social relationships.

Lack of training. It has been extensively documented that complex restructuring and change are intrinsically high in complex and technically intensive organizations (e.g. Lucena, 2006, Fasser, 2002, Guest, 2006). Logically, the continuous need for change requires the organization to equip their employees with the necessary support through the delivery of appropriate training and skill development. This investment provides the employee with transparent understanding and

knowledge of their work, leading to work effectiveness. In ChemCo's case, upon the opening of Beta, a rigorous training program was designed to update and retrain employees. Based on the data, it was revealed that the training program for operators was extensive comprising almost "*five months of class training*". However, Brent, Bob, Lincoln and Jay believed that they received incomplete or inadequate training. From these descriptions in Table 6, it is apparent that the perceived lack of training evoked a negative response. In general, there was an overwhelming perception that "*management just didn't give a damn*" about Alpha cases, leading Alpha members to believe that management "*was definitely not on our side*". This lack of support meant that many cases had to learn the complicated work processes on their own and led some to feel "*engulfed with stress*" and "*abandoned*" preventing them from feeling part of Beta or its subgroups.

Social isolation

The isolation of the maintenance and engineer's workshop, which remained on Alpha grounds, was a reported issue for five of the case studies (Bob, Jonathon, Nick, Lincoln and Sam). During the early design and construction phase of Beta, it was decided that workshops would be attached to Beta; however, this initial plan was eliminated due to budgetary issues. As a result, maintenance and engineering personnel are required to traverse through Alpha over to Beta to tend to jobs whereby groups are usually dispersed through the two facilities at any given time. Cases explain the "*lack of personal interaction*" shared with their colleagues and managers. Respectively, Bob and Jonathon explain the feeling of "*social isolation*" and "*an eerie sense of being removed from everyone else*". Jonathon further explains, "*We are so far away from everyone, so even if we wanted to establish new relationships, it's almost impossible to.*" For Nick, the isolated workshops have meant that he does not see his manager or colleagues much as they may be working on the other side of ChemCo. He explained of both the "*loneliness*" as well as "*hardship of not having anyone else to help me*". Communication acts as a vehicle to transmit and alter norms and is regarded as imperative thus in its absence, it is understandable how reconstruction can be hindered (Postmes et al., 2005).

The difficulty of professional identity reconstruction hindered by isolated workshops was epitomized by case study Lincoln. Lincoln viewed himself as an outsider at the beginning of his employment at ChemCo. He explained that this view was triggered as he entered ChemCo as an "*international*" was further exacerbated by the manner in which he was introduced into his group. His role as the lead engineer during the construction of Beta allowed him the chance to "*start again*" and he "*thrived on the opportunity*". Upon the completion of Beta and the decision not to build workshop facilities within Beta forced him to "*physically remove from everything and everyone at Beta*". In Lincoln's situation, he perceived himself to be directly responsible for the construction and commissioning of Beta thus, the new facility and his commissioning group represented the physical dimensions that facilitated his definition of self (Hauge, 2007, Proshansky, 1978). Lincoln's fondness and affection for Beta highlighted his tendency for place attachment (Low and Altman, 1992, Scannell and Gifford, 2010). Consequently, Lincoln's physical removal from Beta facility and placement into the workshop disrupted this attachment, leading him to feel socially alienated, nostalgic and dislocated (Rooney et al., 2010). Lincoln explained this separation had "*reminded me of how I felt when I first entered*", revealing the significance of being accepted into a social group and the feeling of belonging.

Lincoln reflected on his experience at ChemCo and thoughtfully explained that during T3 he felt "*socially isolated*", which he explained affected his work motivation. It is interesting that during the last interview, Lincoln divulged that he was looking outside of ChemCo and had in fact applied for several positions overseas. Later communication confirmed that Lincoln had received an offer and had left ChemCo. As indicated in the literature review of social identity, individuals tend to use their group membership as a source of positive self-esteem (Hogg and Abram, 1990). For this reason, if the individual's present group fails to provide this, members are likely to leave the group. In Lincoln's case, he had decided to leave his group and the organization entirely.

Group Heterogeneity

Case studies Tom, Gavin and Smith revealed the composition of the work group made a difference in their ability to reconstruct their professional identity. Specifically, they claimed that prior to Beta, the Alpha group was similar (e.g. similar age, background, experience etc.). This changed after entering Beta as they claimed that the heterogeneity of the group hindered their ability to connect on a deep level with Beta groups, and hence affected their ability to feel that they belonged with the new groups. Alpha's workforce mainly comprised of white males in their late forties and fifties, each with an average of 25 years tenure at ChemCo. Most considered themselves to be "*blue-collared*" and had experience in various trades. This description is starkly different to a number of new employees who were mostly younger, ethnically diverse, academically qualified and possessed great technological knowledge but less technical experience.

For Alpha cases who were allocated into the various work groups, some cases were allocated into groups, which included other ex-Alpha members, and in some, all new employees. For those who were allocated into groups or shifts whereby there were familiar faces, the change process was easier to adapt to. For instance, Stephen indicated that he eventually was able to reconstruct his professional identity to include elements of the new groups into his own self-concept. He explained that his process was made easier as he was on shift with two Alpha members (refer to Table 5). In contrast, Tom, Gavin and Smith reflected that the process had been difficult for them. Tom and Gavin especially were placed into different groups that included all unfamiliar newcomers. They explained that although attempts of integration were made, it was more "*superficial than how it was before*":

Traditionally, it has been claimed that individuals are more likely to self-categorize themselves into social groups whereby they believe the group is more similar or homogenous (Schneider, 1987) and enact in ways to maintain group homogeneity (Konrad and Gutek, 1987). Due to the importance of group homogeneity on category attractiveness, when group composition is deemed heterogeneous, members are likely to question, "Do I belong here?" or "Do I want to belong here?" Consequently, this evaluation may influence members to draw away, to become less attached to the social group (Tsui et al., 1992) as displayed by the above cases.

The importance of group homogeneity can be appreciated by contrasting the above four case studies with case study Lincoln. Over the span of the three years interviewing Lincoln, he often portrayed himself as a misunderstood outsider who never gained the social acceptance of his Alpha peers. After 14 years of employment at Alpha, his choice of noun (e.g. "*foreigner*") used to define himself provided an insight into his persistent perception of social inadequacy and lack of acceptance. T1 was captured in T3 using both retrospective methods of photo elicitation and social identity cognitive mapping to trigger his memory of the commissioning phase of Beta. During T1, Lincoln described that he was "*literally*" responsible for the design, construction and commissioning of Beta and was one of the leaders in the commissioning group. This group consisted of a number of Alpha engineers and senior managers as well as new recruits. Lincoln enthused that this was an "*exhilarating process to be involved in*" and provided him with an "*opportunity for a fresh start*" as he quickly developed social relations with his new group. However, unlike Bob and Tom who categorized themselves as Alpha during the early phases of measurement, Lincoln reported, "*I am glad I left Alpha behind, thank God!*" and "*No I don't miss it or them [Alpha facility and Alpha employees].*"

Lincoln firmly indicated that he socially identified with Beta in T1, explaining that he had "*a lot to do with how it looked, worked, everything*" and proudly claimed that, "*Beta is a huge part of me...I saw it from ground up...and was there every step of the way*". This is an important statement shedding light into the intimacy Lincoln felt with Beta. There is a sense of translucent interchanging between the facility and him whereby Beta's characteristics and attributes were reflected in him. In addition, his extensive time spent working on the design and construction of the new facility meant that Lincoln was more familiar with the new site and had developed close

relationships with other new employees. In T1, he claimed he had reconstructed his professional identity to align completely with the new Beta professional identity. However, over time and due to perceptions of exclusion based on the location of workshops, Lincoln gradually dissociated himself from his collective before leaving the organization altogether.

Conclusion

This study followed 25 new and existing nuclear operators over a period of three years to understand the construction and reconstruction of identity during gamma change. Results of our study led to the following three propositions:

- 1. Cognitive processes of anticipation categorization and self-categorization are triggered at the onset of professional identity construction for all cases. New employees and existing employees with lower level of identification to Alpha embraced the Beta identity with ease. However, existing employees with high level of identification with Alpha experienced anxiety and stress at the onset of the change process.**
- 2. The manner in which group properties are internalized is influenced by age and level of experience**
- 3. Experienced employees are likely to engage in inductive internalization to influence their new professional groups however, if their effort is rejected, the presence of the enabling factor of group homogeneity buffers the perception of social disconnect and aids in the reconstruction of one's professional identity. On the other hand, the presence of disabling factors can hinder the construction of one's professional identity.**

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Table 1. Demographics

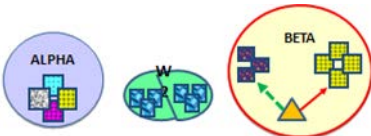
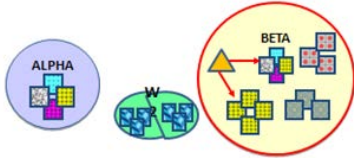
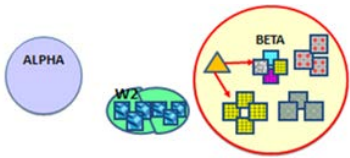
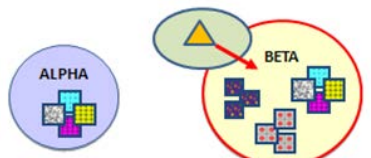
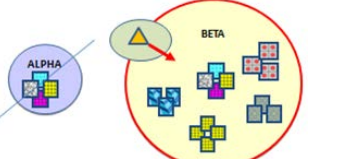
Case	Age range	Facility originating from	Tenure (yrs)	Background and entry into Beta
Denver	<25	Beta	5	<ul style="list-style-type: none"> • Qualified as an engineer and entered ChemCo as a graduate
Michael	<25	Beta	5	<ul style="list-style-type: none"> • Qualified as an engineer and entered ChemCo as a graduate
Jennifer	<25	Beta	6	<ul style="list-style-type: none"> • Qualified as an engineer and entered ChemCo as a graduate
Lloyd	26-30	Beta	6	<ul style="list-style-type: none"> • Qualified as an engineer and entered ChemCo as a graduate
William	26-30	Beta	6	<ul style="list-style-type: none"> • Qualified as an engineer and entered ChemCo as a graduate
Reece	26-30	Beta	3	<ul style="list-style-type: none"> • Science degree • Experience in hospitality industries
Howard	50>	Beta	4	<ul style="list-style-type: none"> • Over 26yrs of engineering experience • High level of experience acquired from private sector prior to joining ChemCo • Recruited from overseas
Adrian	36-40	Beta	4	<ul style="list-style-type: none"> • High level of experience acquired from private sector prior to joining ChemCo
Edward	41-45	Beta	6	<ul style="list-style-type: none"> • High level of experience acquired from private sector prior to joining ChemCo
David	41-45	Alpha	9	<ul style="list-style-type: none"> • Entered into another training program for all process handlers when Beta commissioned • His entire work group from Alpha received training and transferal
Billy	41-46	Alpha	27	<ul style="list-style-type: none"> • A member of the commissioning group and involved in the construction and commissioning of Beta facility
Brian	31-35	Alpha	8	<ul style="list-style-type: none"> • Youngest observed member at Alpha • Immediate entry into training & into Beta • Work group consisting of members with similar age and background
Stephen	50>	Alpha	21	<ul style="list-style-type: none"> • Promised immediate training but delayed by 9mths • One of the last operators to be transferred into to operational training • Shift group at Beta comprises of ex-Alpha members
Julian	50>	Alpha	7	<ul style="list-style-type: none"> • Immediate entry into training • Reapply for operator position • Shift group at Beta comprises of ex-Alpha members
Wallace	50>	Alpha	26	<ul style="list-style-type: none"> • One of the last operators to be transferred into to operational training • Shift group at Beta comprises of ex-Alpha members
Lincoln	50>	Alpha	14	<ul style="list-style-type: none"> • One of the lead engineers responsible for the design and building of Beta. • Leading member in the opening group at Beta
Bob	50>	Alpha	37	<ul style="list-style-type: none"> • Internally applied for position within Beta • Transferal post-Beta opening • Only received partial training prior to commencing work at Beta
Jonathon	50>	Alpha	39	<ul style="list-style-type: none"> • Internally applied for position within Beta • Transferal post-Beta opening • Only received partial training prior to commencing work at Beta
Nick	50>	Alpha	19	<ul style="list-style-type: none"> • Internally applied for position within Beta • Transferal post-Beta opening • Received full training prior to commencing work at Beta
Jay	50>	Alpha	19	<ul style="list-style-type: none"> • Internally applied for position within Beta • Identical work and no training received

Smith	50>	Alpha	26	<ul style="list-style-type: none"> • Role became redundant post commissioning
Gavin	50>	Alpha	26	<ul style="list-style-type: none"> • Retired upon the opening of Beta for 6 months • Returned with smaller roles in both management and administrations for Beta
Brent	46-50	Alpha	9	<ul style="list-style-type: none"> • Internally applied for position within Beta • Identical work • Minor training received, learning on the job
Sam	50>	Alpha	26	<ul style="list-style-type: none"> • One of the senior mechanics involved in the construction of Beta • Only received partial training prior to commencing work at Beta
Tom	50>	Alpha	20	<ul style="list-style-type: none"> • Internally applied for position within Beta • Transferal post-Beta opening • Received full training prior to commencing work at Beta
*Estimated tenure at T3				

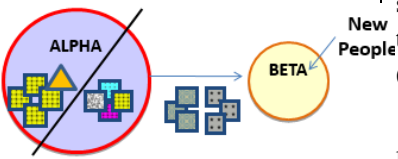
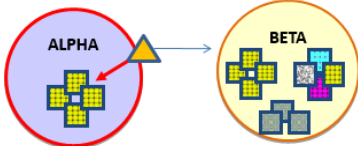
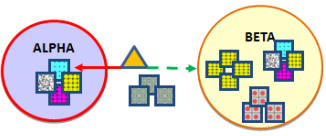
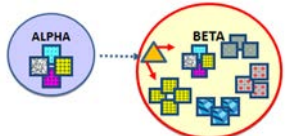
Table 2: Identification Patterns across all Cases

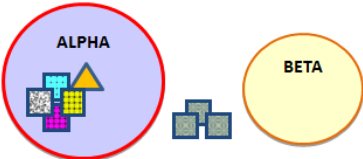
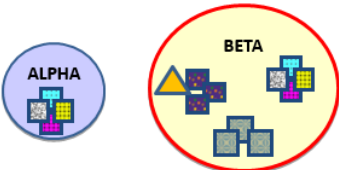
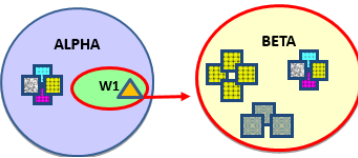
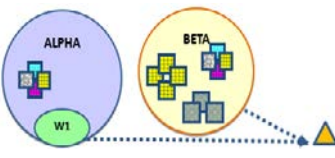
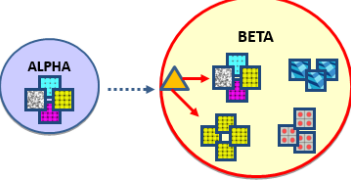
Case	Cognitive processes of professional identity				Enabling factors			Disabling factors					
	Anticipatory categorization	Self-Categorization	Deductive internalization	Inductive internalization	Group homogeneity	Prior identification	Enhanced social status	Group heterogeneity	Psychological contract breach	Perceived exclusion during construction	Social isolation	Perceived lack of organizational support	
Denver	Yes	Yes	Yes	No	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Michael	Yes	Yes	Yes	No	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Jennifer	Yes	Yes	Yes	No	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Lloyd	Yes	Yes	Yes	No	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
William	Yes	Yes	Yes	No	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Reece	Yes	Yes	Yes	No	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Howard	Yes	Yes	No	Yes	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Adrian	Yes	Yes	No	Yes	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Edward	Yes	Yes	No	Yes	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
David	Yes	Yes	No	Yes	Yes	No	Yes	No	No	No	No	No	
Billy	Yes	Yes	No	Yes	Yes	No	Yes	No	No	No	No	No	
Brian	Yes	Yes	No	Yes	Yes	Yes	Yes	No	No	No	No	Yes	
Stephen	Yes	Yes	No	Yes	Yes	Yes	No	No	Yes	Yes	No	Yes	
Julian	Yes	Yes	No	Yes	Yes	Yes	No	No	Yes	Yes	No	Yes	
Wallace	Yes	Yes	No	Yes	Yes	Yes	No	No	Yes	Yes	No	Yes	
Lincoln	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes	No	Yes	Yes	exit
Bob	Yes	Yes	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	
Jonathon	Yes	Yes	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	
Nick	Yes	Yes	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	
Jay	Yes	Yes	No	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	
Brent	Yes	Yes	No	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	
Gavin	Yes	Yes	No	Yes	No	Yes	No	Yes	No	No	No	Yes	
Sam	Yes	Yes	No	Yes	No	Yes	No	Yes	Yes	Yes	Yes	No	
Smith	Yes	Yes	No	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	
Tom	Yes	Yes	No	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Exit

Table 3: All Cases experience anticipation and self-categorization

Case	T1	T2	T3
Lloyd	<p>Anticipatory categorization</p> <p>“I read a lot, current affairs as well as history, I knew about ChemCo and that they were building a new facility...before applying.”</p> <p>“I was both nervous and excited.”</p> <p>“For most of us in the group, this was our first major job, let alone major project...we were all thrilled to come in at this time.”</p> <p>Self-categorization</p> <p>“There are clear separations between Beta and Alpha.”</p> <p>“Maintenance has its own culture. There are 'the sparkies' and 'the engineers'. For some reason, there has always been tension between the two.”</p> 	<p>Self-categorization</p> <p>“I know it's been mentioned before, but the ‘us’ and ‘them’ mentality still rears its head sometimes...for instance, in how we unconsciously select our words, like saying ‘we’, ‘us’ or ‘our’ facility. Or ‘we’ did this.”</p> <p>“Engineers and techies [sic] guys are still socially distinct...but our group is also as well.”</p> 	
Jennifer	<p>Anticipatory categorization</p> <p>“What happens with new employees for Beta, they are all engineers or scientists, right, they all have a degree, so I knew I'd fit in.”</p> 	<p>Self-categorization</p> <p>“I think the older people always think they are being exploited in some way or another if you know what I mean.”</p> <p>“I’ve only had the opportunity to judge bits and pieces, mainly when they come over for their training and they have got an attitude.”</p> <p>“They are talking about shift patterns, they want their old shift pattern and they have spoken to the young guys about the hours they should be working and this and that, but yeah, people make up their own minds.”</p>	
David	<p>Anticipatory categorization</p>		

	<p>"See for me it was an exciting time...I was part of the commissioning team...on the forefront of everything in ChemCo."</p> <p>"Can't say I understand the nerves and anxiety as you [the researcher] have described...maybe the guys left behind felt that, I dunno [sic]."</p> <p>"I was looking forward to getting in here, working on a new facility, reinvigorates your energy you know. For me personally, anyway, because I left Alpha a different way than anybody else, so I was looking forward to it."</p>		
Billy	<p><i>Anticipatory categorization</i></p> <p>"I was ecstatic."</p> <p>"For ages, they thought they were the kingpins." (reference to Alpha operators)</p> <p>"We were never really part of the "in-crowd" anyways [sic]...the operators had their own culture and it didn't include us."</p>		
Stephen	<p><i>Anticipatory categorization</i></p> <p>"Evaluated my future with ChemCo and weighed my options."</p> <p>"It wasn't easy for some of the blokes. Fact is, we knew we were going to lose some of the guys, but we didn't know who, how many or when..."</p> <p><i>Self-categorization</i></p> <p>"Yeah, I have seen 'em [sic]</p>	<p><i>Self-categorization</i></p> <p>"I have been an operator in that [Alpha] facility for so long, it has become part of me, and I can safely say, most of us feel this way."</p> <p>"...us [Alpha] guys."</p> <p>"It is the wrong type of people, they are not staying in the divisions very long, they are 'degree people', if you know</p>	

	<p>young blokes through the metal fence on my way in and out, but just don't care to introduce myself and so forth, you know?"</p> 	<p>what I mean, they have come straight out of university, they are looking for onwards and upwards, they are not going to stay in this sort of area, because they are going to stagnate." (reference to Beta)</p> <p>"Yeah, it is hard, because uh, a lot of my group, half of my group is still over at Alpha, so I don't know whether they really ever considered themselves fully part of Beta, even though they are. It is almost like we still have the old school Alpha mentality so we stand back and look at you know, I don't know we still have a little bit of the old school mentality."</p> 	
Julian	<p>Anticipatory categorization</p> <p>Researcher:</p> <p>"These photos show the end product, which is Beta. At this point, you knew that there would be some massive changes with your work, the structure of your workgroup, and even your direct working environment. What were the things that you were thinking then?"</p> <p>Julian:</p> <p>"Really, the only thing I was concerned with was being made redundant. We saw a lot of guys leaving, so there was a fear going around. Yeah, we saw many of the younger kids coming in and we didn't really know what was going to happen to us lot. It was a nervy time that time."</p> <p>Self-categorization</p> <p>"younger kids"</p> <p>"Not much in common with these young kids."</p>	<p>Self-categorization</p> <p>"...maybe still Alpha"</p> 	

	<p>“There was a bit of resentment towards management during the initial stage.”</p> 		
Lincoln	<p>Anticipatory categorization</p> <p>“It was [sic] exhilarating process to be involved in.”</p> <p>“I literally watched and constructed Beta from nothing, back when it was a flat piece of land to this major internationally renowned facility.”</p> <p>“For me, it was an opportunity for a fresh start.”</p> <p>Self-categorization</p> <p>“I am glad I left Alpha behind, thank God!”</p> <p>“No I don't miss it or them [Alpha facility and Alpha employees].”</p> <p>“There is an ‘us’ and ‘them’ mentality.”</p> <p>“We want them to see just how big this new facility was going to be. It was going to be everything Alpha wanted it to be.</p> 	 	
Brian	<p>Anticipatory categorization</p> <p>"Once in a lifetime opportunity, I am sure there will be a coming down effect, but it's a hive of excitement now".</p> <p>"For me it was easier as I was one of the first one sent over...i think the other guys especially guys like Stephen and Wallace...yeah, it was different for them"</p>	<p>Self-categorization</p> <p>"Clear cut difference in blue collar and white collars"</p> <p>"Mature bunch of blokes who were a lot older than me, but they are great blokes...they placed a high value on hard work, more so than these Beta guys I reckon"</p>	

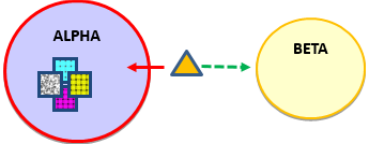
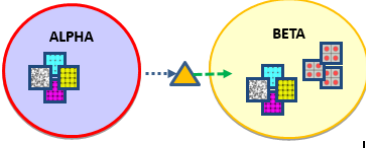
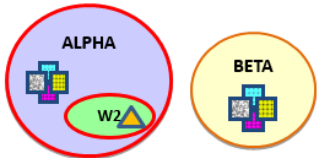

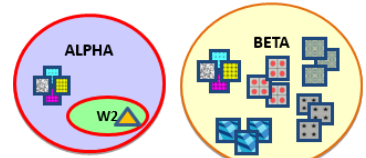
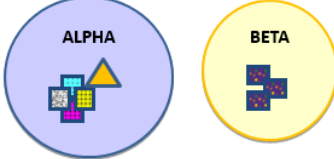
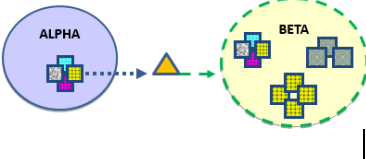
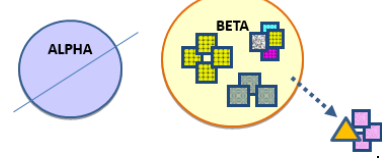
			
Jonathon	<p>Anticipatory categorization</p> <p>"Before the construction of Beta, we were all excited...but that quickly evaporated, we weren't allowed to even touch the thing."</p> <p>"I did consider opting for retirement before commissioning."</p> 	<p>Self-categorization</p> <p>"Oh yeah, there is a clear cut difference between us."</p> <p>"The social space between us is too great."</p> <p>"I will always be part of Alpha, and Alpha will be part of me, I suppose."</p> 	<p>Self-categorization</p> <p>"No, still here (pause) in these workshops. Not much has changed mate. I'm still here and they're still there."</p> 
Tom	<p>Anticipatory categorization</p> <p>"I was lucky; I had just reached my retirement age so I had the choice to leave when others didn't."</p> <p>"See most of the guys in my group were a bit younger than me, by a couple of years maybe, so they were pretty anxious."</p> <p>Self-categorization</p> <p>"We're [Beta] not as close...or tight-knit as how we were in Alpha."</p> <p>"There are many differences, I mean just look at our hair compared to theirs. Most of us are either bald, balding or have white hair...whilst these kids have a full head!"</p> 	<p>Self-categorization</p> <p>"The young bloke who is my shift supervisor, I used to say check his bag for knives and guns because he was just on the outside all the time you know."</p> <p>"The new guys are great, don't get me wrong, but they're not like us, or not like me if that makes any sense...Conversations is very surfacey [sic] and there is no real connection. Maybe it's the age, the upbringing, the past, or everything. I'm unsure...but what I do know is that the gap is wide."</p> <p>"I think if there were a few more Alpha guys on shift, it would helped the transition."</p> 	

Table 4: Process of internalization

Case	T1	T2	T3
Denver	<p><i>Deductive</i></p> <p>"You got to be a team-player here."</p>	<p><i>Deductive</i></p> <p>"I guess I am one of the few lucky ones to be mentored by someone as great as Smith...he made it much easier for me, showing me the ropes to everything around ChemCo</p>	
Michael	<p><i>Deductive</i></p> <p>"One of the advantages with the guys who came across from Alpha is most are experienced in operations."</p> <p>"Because you are new, your skills and knowledge is still developing...and you often rely on those with more experience such as your shift manager or those who have been here longer than yourself."</p>	<p><i>Deductive</i></p> <p>"There is a sense of pride in your work, and because you are in a team you didn't want to do half the job, because it could affect things in the future."</p>	<p><i>Inductive</i></p> <p>"I emphasis on the sharing of information rather than being protective of your own knowledge and skills."</p>
Howard	<p><i>Inductive</i></p> <p>"...when the system is not ready, you try to do your very best, and sometimes the problem is your opinion, there are some steps that are too complex or difficult to implement...or people just don't listen to you."</p>	<p><i>Deductive</i></p> <p>"I would have to say that some of the primary characteristics of the safety culture have been carried over, so Beta has benefited from those decades of experience, it has brought some things into the organization."</p>	<p><i>Inductive</i></p> <p>"I suppose when you have a problem there is a lot of discussion with many people giving opinion, but sometimes the people that are speaking don't have the complete picture and don't have the training, it takes a long time to solve the problem you need to have someone who knows their stuff and can communicate it"</p>
Brian	<p><i>Inductive</i></p> <p>"Think they gotta watch and learn first before they start talking."</p>	<p><i>Inductive</i></p> <p>"Guys at Alpha have a lot more experience compared to staff at Beta...I think has been a lot of looking up to us if you get my drift."</p>	
Stephen	<p><i>Inductive</i></p> <p>"You have got to have some mechanical or electrical skills, you have got to be able diagnose problems, operate machinery, think for yourself, and be responsible to the shift manager or whoever is in charge at the time,</p>	<p><i>Inductive</i></p> <p>"Most of these guys (Beta) are learning from us (Alpha)."</p> <p>"Membership was earned through experience, tenure and hard work."</p> <p>"There were conflicts at the</p>	<p><i>Deductive</i></p> <p>"The most important thing comes up in the morning meeting. And we find out that way, what we have to deal with...but it's more of a chance to chat with the boys and develop the social</p>

	and obviously you have to be totally aware of what is going on. You can't sit on your hands if something goes wrong."	beginning, I won't lie, but hey, I've been here for a quarter of my life. They knew I had something of value to offer the team so they were accepting of the ways I did things because they knew I was right."	bit, if you know what I mean."
Smith	<i>Inductive</i> "There was an undeniable strong bond and team mentality shared within Alpha staff whereby everyone shared a common set of attitudes, which was predominantly shaped by team leaders and supervisors."	<i>Inductive</i> "Advantage doing it the Alpha way because you get professionals or control room staff to develop a greater appreciation of the operation of the facility whereas at this stage they don't just sit in the control and operate the computer screens."	
Gavin	<i>Inductive</i> "There is a level of knowledge and confidence in staff when operating. In terms of Alpha, there is a very mature group of operating staff...they were generally in their 40-50's...this applied to management as well as the facility operation itself. This all amount to a very very healthy respect for safety."	<i>Inductive</i> "Knowledge and experience was pertinent in the success of Alpha. Everyone had extensive knowledge in how to safely operate the facility and work within this environment...Beta will have to learn this, so it should be the case whereby mentoring is placed in higher regard"	
Brent	<i>Inductive</i> "Not much of Alpha experience appears to be relevant. Beta do not understand how much relevant and valuable this experience. Although the facility is obviously different in nature, there are still "commonalities" that should be acknowledged, therefore the experience is quite relevant".		

Table 5: Group composition and opportunities for social support are critical enablers of professional identity

Case	T1	T2	T3
Brian		<p><i>Group homogeneity</i></p> <p>"Older guys on the shift make you feel comfortable."</p>	
Stephen	<p><i>Group homogeneity</i></p> <p>"The last few months in particular have been tense. You see these younger folks go into the new facility, and you hear nothing about it yourself although you have been here longer and know much more. Nothing about training possibilities, nothing. It makes think you don't it? But the lads here have all stuck together and...We'll just have to see what happens."</p>	<p><i>Group homogeneity</i></p> <p>"The other two blokes I work on the shift with has made it easier for me. Yeah, some of my best friends are in this team. I don't think it would have been the same if I'd gone through this by myself."</p>	<p><i>Group homogeneity</i></p> <p>"a feeling of unity"</p> <p>"being on shift with my best (Alpha) friends help"</p>
Julian	<p><i>Group homogeneity</i></p> <p>"Hmm...Yeah, I'd say so. We only had each other then."</p>	<p><i>Group homogeneity</i></p> <p>"Most of the other guys were around my age."</p> <p>"Similar work experience".</p>	
Wallace		<p><i>Group homogeneity</i></p> <p>"Yeah, being on shift with the old Alpha guys have help heaps"</p>	<p><i>Group homogeneity</i></p> <p>"Both Stephen and Julian are rostered on my shift..."</p>

Table 6: Psychological contract breach, perceived social exclusion and perceived lack of organizational support are critical disablers of professional identity

Case	T1	T2	T3
Lincoln	<p><i>Group heterogeneity</i></p> <p>[I was considered an] “International”, a “foreigner” by Alpha."</p>	<p><i>Perceived exclusion – isolated work areas</i></p> <p>"What is really wrong about this set up is that all of engineering is here, except for my group, we are all right next to the Control ...right next to Alpha. Which makes us kind of, we are segregated, and any time you have segregation by distance, even if it is just down the road you don't work effectively as a team, nor do you feel as part of a group. Just bits of fragments. And even in the day and age of emails and everything else, if you are just around the corner it is a lot better than down the street. We have to go through turnstiles and security and everything else. It's just a bother of mine."</p> <p><i>Perceived lack of management support -lack of training</i></p> <p>"We need to have project training. We need to have training in procedures. We need training to know all the systems...I don't like not being trained and am expected to train myself, all that, I've just gone, "I'm out of here"."</p>	<p><i>Perceived exclusion – isolated work areas</i></p> <p>"I don't really belong to Alpha or Beta...just stuck in my shop."</p>

Bob	<p><i>Perceived exclusion – during construction / commissioning</i></p> <p>“We waited to be asked for our opinion of Beta, they never asked...so we were never part of the process which of course will affect my ability to feel anything for it.”</p> <p><i>"Never once did they come to any of us for any sort of help."</i></p> <p><i>Psychological contract breach – job security</i></p> <p>"Jon and I waited for months to hear back from management only to learn that we had to apply for our positions over at Beta...They promised us that we were safe, then they said the reapplication was a formality...I can say that both Jon and I felt resentment towards management and our trust became distrust."</p>	<p><i>Psychological contract breach – job security</i></p> <p>“I know I bought this up last August when we first talked but the feelings are still brimming just below the surface...I've gave them almost half of my life, dedication and all. And they couldn't even keep their words with us...I can't look at them [management] at the moment.”</p> <p>Perceived lack of organizational support – training</p> <p>“So when the facility was finished they said, “Oh off you go then, no training or anything”. We had a three day course on facility systems and that was it, and they said, “Off you go”. Unbelievable.”</p>	
Jonathon	<p><i>Perceived lack of management support</i></p> <p>"Management had it in their minds to break down the Alpha culture...What was wrong with our culture? It worked for the last 50 years, so why change it. I don't understand."</p> <p><i>Psychological contract breach – job security</i></p> <p>"We had to apply for our jobs over here, they advertised them, they just weren't given to us...It put a lot of pressure on our staff, who have been there nearly all their lives, twenty five year, thirty year blokes in experience, and then all of a sudden you have got to apply to get your job over here. Some of them felt they weren't wanted, no reason really, but you know."</p> <p>"Yeah, promised the job would be safe...look at us now."</p>	<p><i>Perceived exclusion – isolated work areas</i></p> <p>"The best they tried to do was to bring it down here, but we've proven it from time to time, you need a workshop. We've had equipment we've had to take out, you go over, you've got the facility, the machinery, you can't do it from here, they've got a couple of rooms in Beta that they said we will call workshops, 30 foot underground, you would do a 10 minute job but you wouldn't call it a workshop. They've tried that aspect, but I suppose we go back to what we are used to, and you are just going backwards."</p> <p>“There is an eerie sense of being removed from everyone else”.</p> <p>"These workshops are bloody still on Alpha grounds for Christ's sakes. So not only do we feel ostracized from everyone, we still gotta [sic] make it across all of ChemCo to bloody tend to jobs!"</p>	<p><i>Perceived exclusion – isolated work areas</i></p> <p>“We are so far away from everyone, so even if we wanted to establish new relationships, it's almost impossible to.” Group homogeneity</p> <p>"Think the only compensating thing at the moment is that Bob is here...and Nick is still around too.”</p>

Nick	<p><i>Perceived exclusion – during construction / commissioning</i></p> <p>"The Alpha people got a taste of sour grapes because we weren't asked."</p> <p>:</p>	<p><i>Psychological contract breach – lack of personnel</i></p> <p>"We need the support, but there is none; there is just the just two of us now."</p> <p>"They promised that there would be a few more guys on board, but as usual, they swallowed their words."</p>	<p><i>Psychological contract breach – lack of personnel</i></p> <p>I have not had a break in years. There is no one to fill my place...and I can slowly feel my body starting to give."</p> <p><i>Perceived exclusion – isolated work areas</i></p> <p>"Loneliness as well as the hardship of not having anyone else to help me".</p> <p>"Sometimes for weeks, I don't see my supervisor...I know the work setup is slightly different, but you can't help but to feel alone most of the time."</p>
Jay	<p><i>Perceived exclusion – during construction / commissioning</i></p> <p>"Definitely, the ones who weren't involved don't have any ownership at all, don't really want it. That was the biggest problem."</p>	<p><i>Perceived lack of management support -lack of training</i></p> <p>"Honestly, we had barely any training...it was a process of figuring things out for ourselves."</p> <p>"Solely rely on my team due to the lack of support offered."</p>	<p><i>Perceived lack of management support -lack of training</i></p> <p>"Yeah, we do the Same job, [as in Alpha] manipulating the isotopes, but the machinery and technology and processes are different and we needed the training at that time."</p> <p>"We needed help, and they (management) didn't give us that...we depended on each other."</p>
Smith	<p><i>Perceived exclusion – during construction / commissioning</i></p> <p>"If people had been involved in it or more people involved in it when it was designed, installed, and specified even, I don't think there would have been as many problems as there is today. The people who then weren't involved in the early days, now have the attitude, oh I don't care."</p> <p><i>Perceived lack of support – legacy issues from Alpha culture</i></p> <p>"Perceptions from management is that Alpha is bad...We are not going to drag Alpha into Beta, we are going to start again."</p>		

Gavin	<p><i>Perceived lack of support – management</i></p> <p>"I think they are starting to realize they have got to communicate more with people. I told ChemCo management a couple of things in the last six months that I don't think he liked, but anyway, um, it seems to me that most of the decision making is being made from higher and he is only a puppet. There is not much support there."</p>	<p><i>Group heterogeneity</i></p> <p>"For me personally, I think there is a lack of fit in most groups at Beta."</p> <p>"Management needs to have a careful eye, particularly placing people into their groups. You have younger, less experienced guys telling older, more experienced chaps what to do. It becomes problematic when they are still learning."</p> <p>"The bottom line is we are generations apart."</p>	
Brent		<p><i>Psychological contract breach – lack of personnel</i></p> <p>"We're understaffed. By one per shift."</p> <p><i>Lack of training</i></p> <p>There is probably not enough training for the process guys. Whereas the operators, they get six months dedicated to them. ... You can call us undertrained."</p>	
Sam	<p><i>Perceived exclusion – during construction /commissioning</i></p> <p>"If you get more people involved, everyone feels a part of it, and then there are no problems, but if you get only a small number of people that are part of something new, exciting and different, that it has never happened to before, and there were a lot of people left out."</p> <p>"Alpha had no involvement in the construction and commissioning. This lead to not having a sense of ownership"</p>	<p><i>Perceived exclusion – isolated work areas</i></p> <p>"We are situated; actually, away from Beta...our workshop is still over on Alpha grounds."</p> <p><i>Psychological contract breach – building of work areas</i></p> <p>"I'm probably off the subject now, but when Beta was still on paper, when it was just a concept, the back of the building had an engineering and maintenance facility attached to it, and every building needs engineering and maintenance facility. But they wiped it off the plan, they had to save \$1million, they wiped it straight off the plan, to this day there isn't an engineering and maintenance building attached to this facility."</p>	<p><i>Perceived exclusion – isolated work areas</i></p> <p>"The situation with the workshops are still there I suppose...it would be better both work wise and socially if we were closer to the groundwork... Places a lot of social distance between maintenance and engineering guys"</p>

Tom	<p><i>Perceived organizational support – training</i></p> <p>"I came back on contract about eight months ago, attended the second half of a training course at Beta and I have been here since December last year. Unfortunately, I have been stuck in a trial for the last six months, because there are no staff, which is one of the ongoing issues from Beta, two and half to three years ago."</p>	<p><i>Group heterogeneity</i></p> <p>"The new guys are great, don't get me wrong, but they're not like us, or not like me if that makes any sense... Conversations [sic] is very surfacey [sic] and there is no real connection. Maybe it's the age, the upbringing, the past, or everything. I'm unsure...but what I do know is that the gap is wide."</p>	<p><i>Group heterogeneity AND perceived lack of organizational support</i></p> <p>"In my situation the combination of not having the support I need from my manager, or supervisor and being in a group of kids who I don't really get it and who don't get me has made my decision to get out easy."</p>
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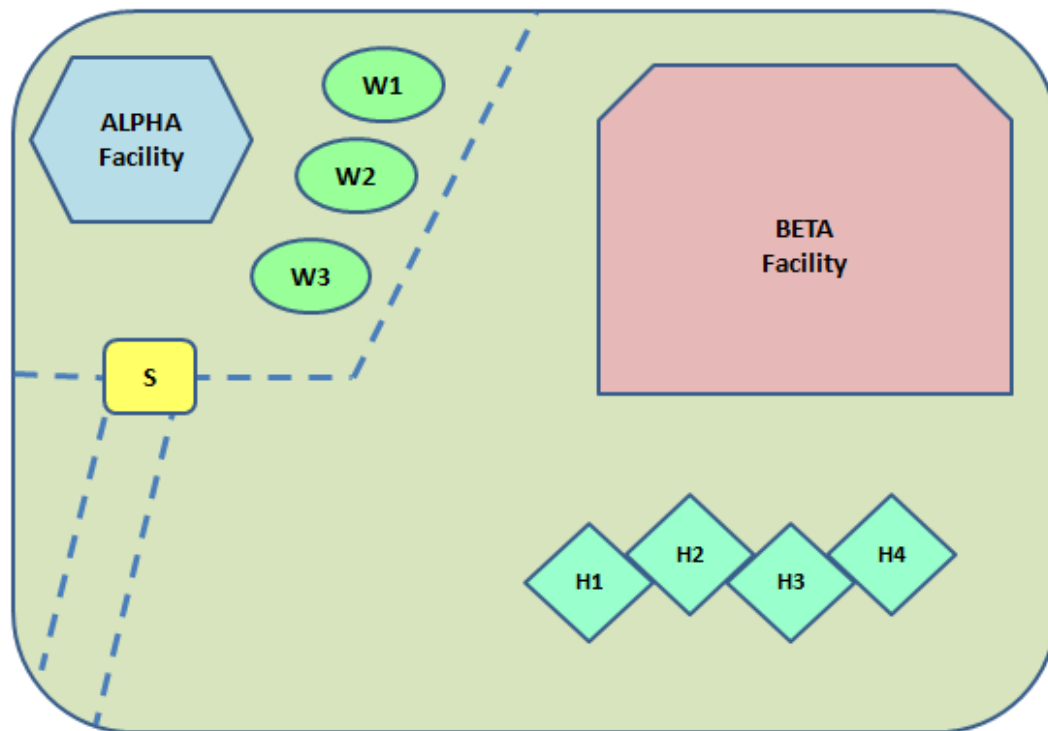
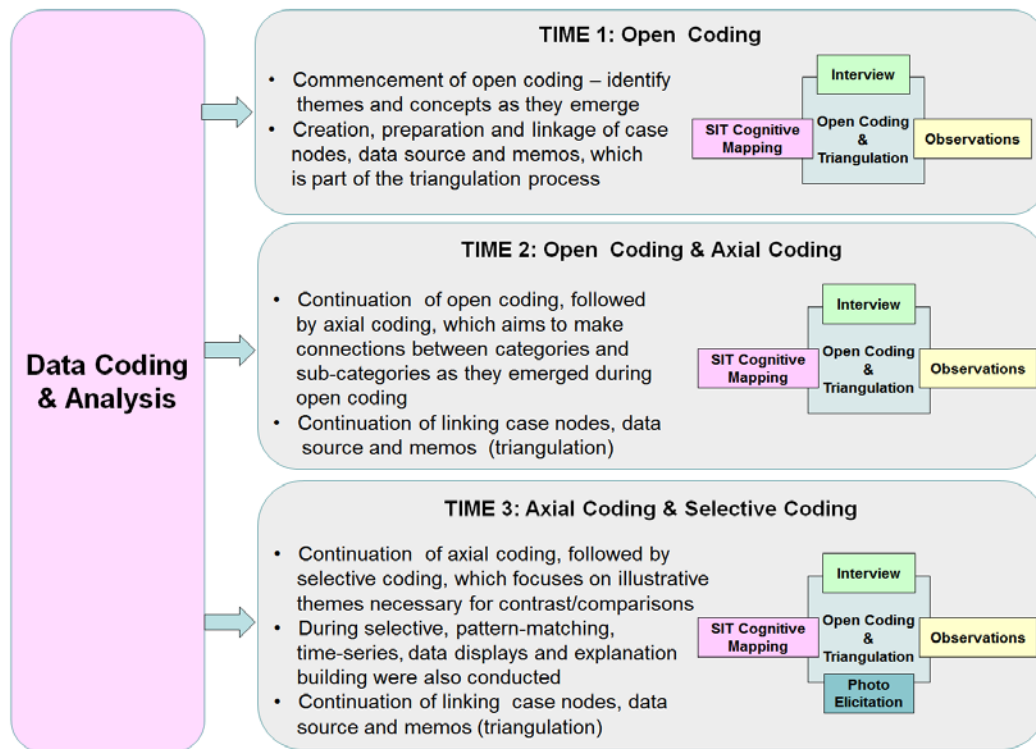


Figure 1: ChemCo after construction of Beta



*Note: Social identity cognitive mapping has been abbreviated to “SIT cognitive mapping”

Figure 2: Data collection and analysis process

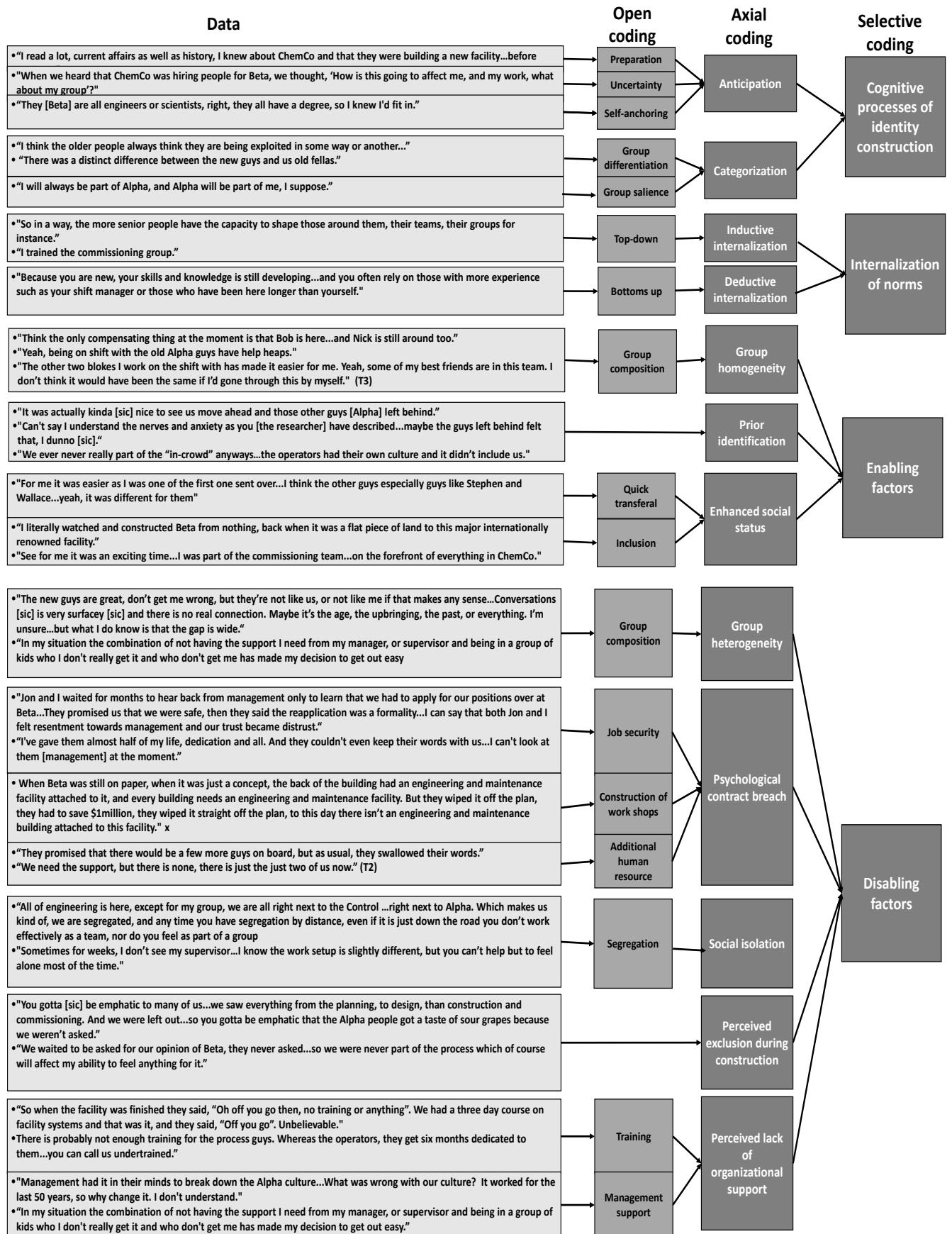


Figure 3: Coding Categories Generated during the Coding Process